



***Ural (Урал) - Dnepr (Днепр)
Russian Motorcycle
Carburetors
Part 19: Inertial Super-Charger***

***Ernie Franke
eaf Franke@tampabay.rr.com
08/2012***

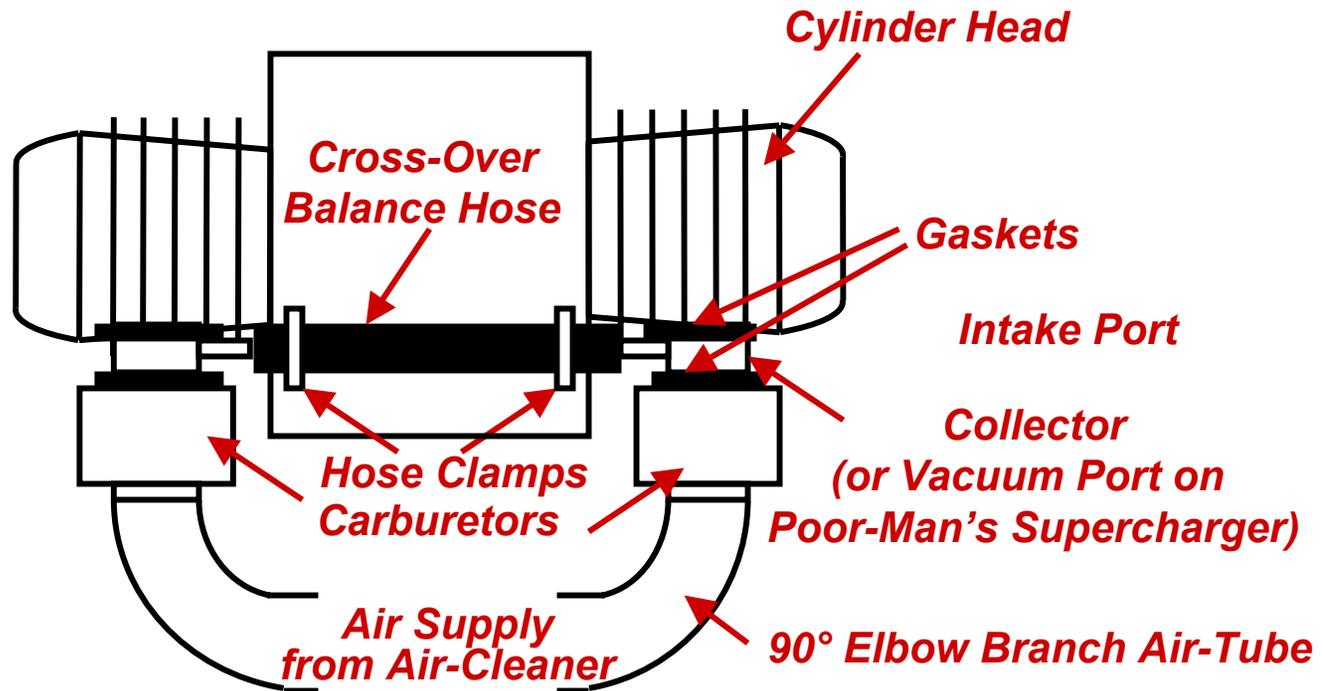
Ural / Dnepr Inertial Super-Charger System

http://russiagarage.com/iss_install.htm

- **Inertial Supercharger System Made by IMZ (Ural)**
 - Not a True Supercharger (at least from the automotive definition)
- **Been Around for a While**
 - Know by Various Names
 - "Ural Turbo"
 - "Inertial Supercharger"
 - "Vacuum Crossover Pipe"
 - Not to Be Confused with:
 - Water/Alcohol Mist Induction (water/alcohol induced into the inlet manifolds)
- **Easy Add-On System: ½-hr Installation**
- **Vacuum Crossover Pipe Gives Improved Performance in Lower RPM Range**
 - Couple of Fittings Connected via Crossover Hose between the Two Intake Manifolds (Air/Fuel Input Port on Each Cylinder)
 - Yields a Little More Low-End Power, but Effect Disappears at Higher RPM
 - Smooths the Idle and Improves the Idle to Off-Idle Transition
- **How It Works**
 - Uses Column of Pressurized Intake Flow on Whichever Intake Valve Just Closed, to Boost the Flow into the Other (open) Intake Valve
- **Redundancy in an Emergency**
 - Throttle Cable Breaks on One Carb; Crossover Will Feed the "bad" Side to Enable a Normal Ride Home, without Trying to Get There on One Cylinder
- **Reported Applications:**
 - IMZ Inertial Super Charger or Ken's U-2 Cycles Upgraded Unit: Dnepr MT-16 (K-68 Carbs), CMSI 2000 Patrol, Dnepr K-650 (K-68, K-301 Carbs), 1994 Ural Tourist (Mikuni Carbs), 1972 Dnepr MT-9 (K-301 Carbs), 2007 Ural Patrol (Keihin Carbs), 1988 BMW R100RT, 2010 Ural Patrol (Keihin Carbs), 2006/2007 Ural Dalesman
 - On Some It'll Be Vertical and Others Horizontal, Depending on Bolt Alignment on Cylinder Head
 - Poor Man's Inertial Super Charger (Use Vacuum Ports on Keihin Carbs): 2000/2003 /2010 Ural Patrols



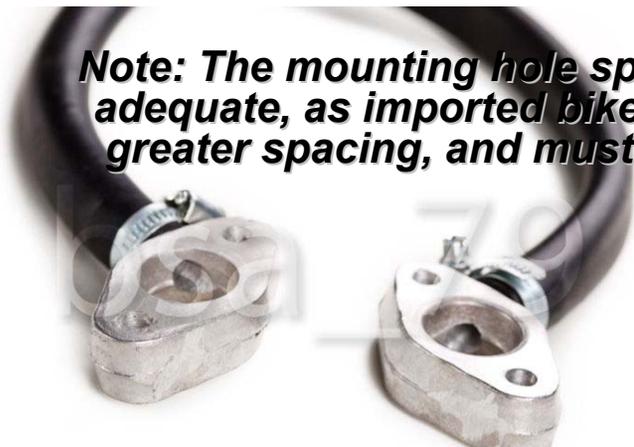
Inertial Super-Charger Installation



The inertial supercharger evens out the 'pulses' between carbs. You can see this for yourself if you have the old compliance fittings. Each fitting will 'squat' or 'pulse' on each intake stroke of the engine. After installing the Inertial Super-Charger, these 'pulses' will be much less evident. Makes for smoother application of power and better drivability.

Imported Russian Inertial Super-Charger System for Ural / Dnepr

Note: The mounting hole spacing may not be adequate, as imported bikes have a slightly greater spacing, and must be ovaled to fit.



Collectors

•Imported Russian Kit Includes:

- Left Collector**
- Right Collector**
- Hose Pipe**
- Two Hose Clamps**
- Two Gaskets**
- Four Studs**

Long Studs



Gaskets

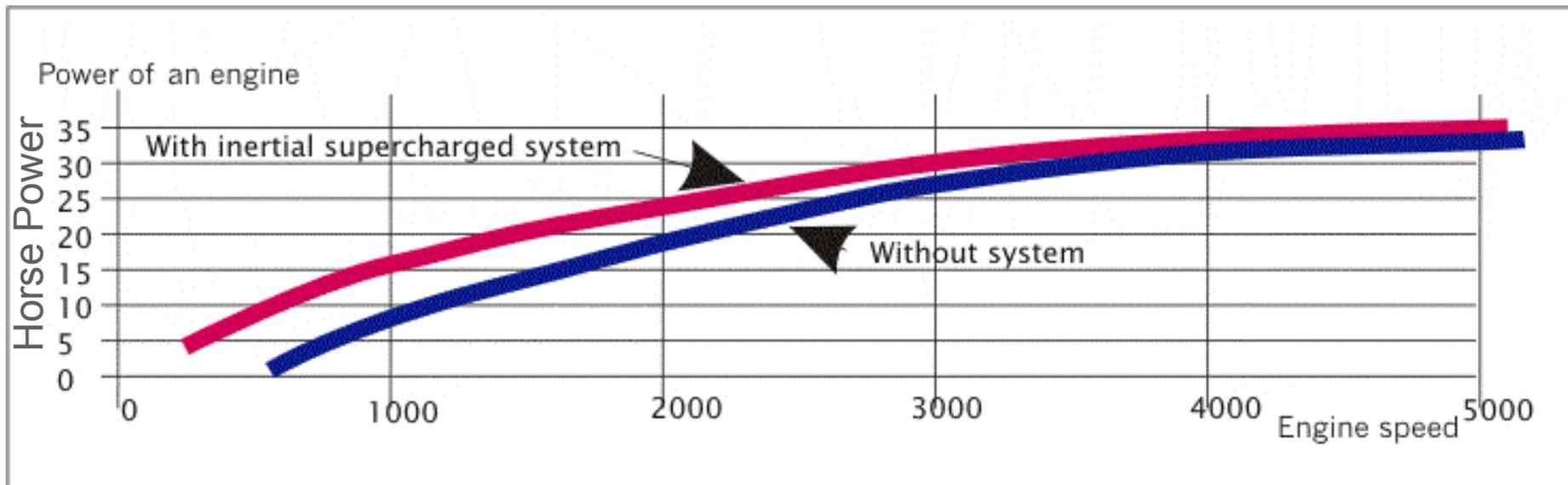


Note: The thread pitch is different on each end of the studs. You must install the side with the larger thread pitch into the cylinder head.

Inertial Super-Charger Performance

(http://russiagarage.com/iss_install.htm)

- System May Save Up to 18% Gas in Urban Environment and 12% Off-Road***
- Increase Power and Acceleration of Engine without Losing Reliability***
- Uses Fuel-Air Flow's Inertia in Left Cylinder for Right Cylinder and Inversely***
- Improves Performance***
 - Up to 1,000 RPM, Adds About 4 HP***
 - Up to 2,000 RPM, Adds About 3 HP***
 - At >3,500 RPM, Power with/without Inertial Supercharger Is About Equal***



Imported Russian Inertial Super-Charger Installation

http://russiangerage.com/iss_install.htm

- **Installation on Ural 650cc Bike**
- **½-Hour Installation**
- **Two 13-14 mm Spanners (Wrenches) and a Hammer/Block-of-Wood Required**



650cc Ural

Step 1. Undo two nuts and remove carburetor. Save gasket!



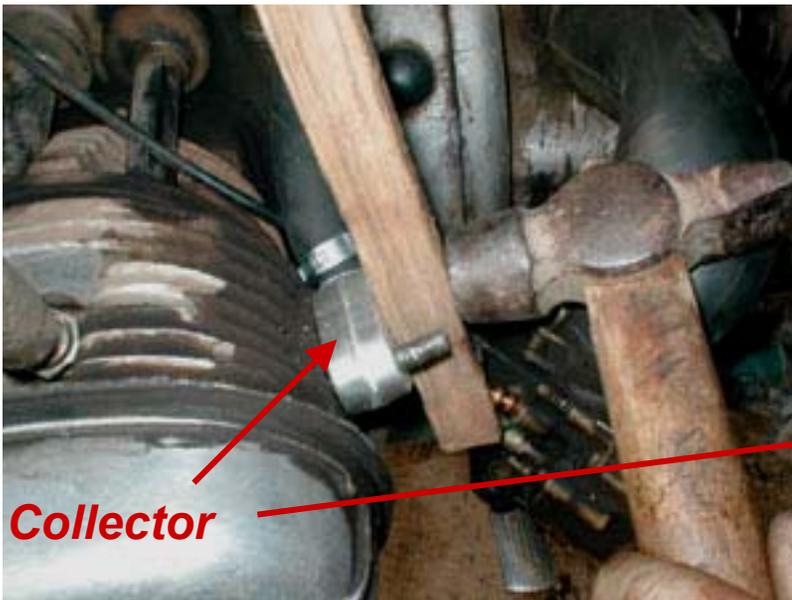
Step 2. Lock two nuts (jam-nuts) on stud using two spanners (wrenches).



Step 3. When you lock nuts, you can remove the old short studs.



Step 4. Mount new long studs.
Note: The thread pitch is different on each end of the stud. You must install the side with the larger thread pitch into the cylinder head.



Step 5. Mount the collector on the new studs.
Lightly bang by hammer via wood's billet.



Step 6. Install new gasket.

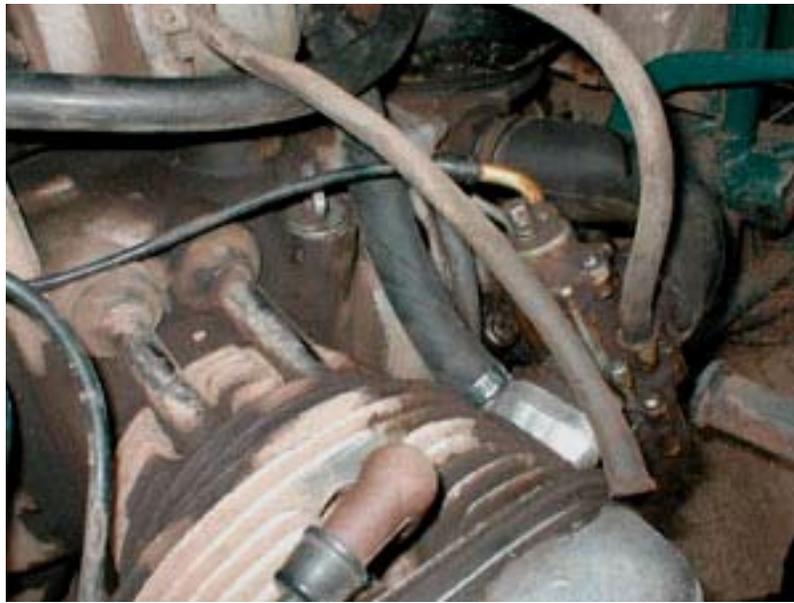


Carb
**Vacuum
Crossover**
Rubber Tubing
Gaskets

Step 7. Fix vacuum hosepipe via yoke.



Step 8. Mount carburetor onto collector.



Step 9. Cross hosepipe between alternator and air filter. Mount second collector into other side.



Step10. When you mount both collectors and start engine, it will run a bit faster. You must re-adjust (lower) the idle screw - see red cursors.

Imported Russian Inertial Super-Chargers Are Found Across eBay



New £19.99 (<http://sovietsteeds.com>)



New \$16.51 USD Mastersss
(www.quickerbuy.com)



New \$17 USD
(www.ebay.com)



New 32.20 €
(www.easthighway.com)



New \$17 USD
(www.russiangerage.com)

Caveat Emptor: Beware of Low Quality Workmanship on Imported Goods

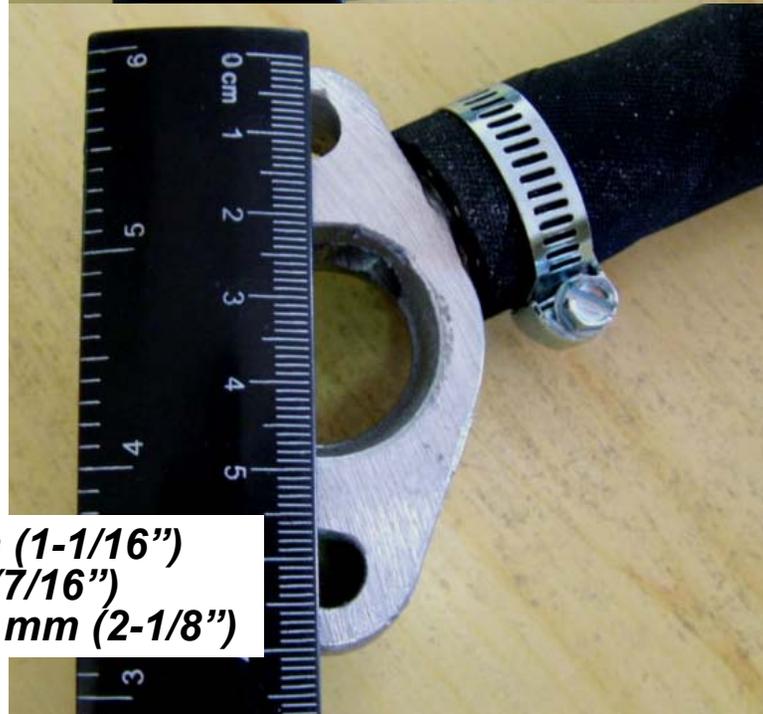
Quality of Imported Russian Super-Chargers on eBay

- **Poor Quality on Imported Inertial Superchargers (unfinished state) from Russia**
 - **As They Come from Overseas, They Are Nearly Useless**
 - **Casting Are Poor and Bore Not Consistent**
 - **Hose Is about 3” Too Short**
 - **For about \$3 at Local Pep Boys for a Two-Foot Section of 5/8” Heater Hose**
 - **Flimsy Gaskets**
 - **When Properly Machined, They Do Well Without Any Attention**
- **Ken Ulrich Has Modified about 90 Sets Manufactured from Russia for Improved Performance:**
 - **Ken Ulrich of U-2 Cycles: Tel: (715) 693-6201, email: Machrat@aol.com**
 - **Drilling the Collectors to Flow as Needed**
 - **Milling the Collectors Yields a Flat Sealing Surface, so Carb Gaskets Seal**
 - **Improved Rubber Hose**
 - **Available at U-2 Cycles for \$50**
- **Applicability**
 - **Ken Has Installed These on All His SV Bikes**

Imported Russian Inertial Super-Charger System for Ural / Dnepr (cgi.ebay.com)



Note: The mounting hole spacing may not be adequate, as imported bikes have a slightly greater spacing, and must be ovaled to fit.



**Manifold Opening = 27.5 mm (1-1/16")
Stud Hole Diameter = 9 mm (7/16")
Mounting Hole Spacing = 54 mm (2-1/8")**

Imported Russian Inertial Super-Charger System for Ural / Dnepr (cgi.ebay.com)



Vacuum Cross-Over Tube

**Long Studs with
Two Different
Threads**



Gaskets



Hypercharger / Inertial Balancer on 650cc Engine with K-68 Carbs by JohnBG (www.sovietsteeds.com)

- **Re-print of a write-up John did on RIMC (Rolling Inferno Motorcycle Club) a while back**
- **John Ordered a Ken Ulrich "U-2 Special" machined inertial hypercharger/balancer assembly.**
- **His 650 rig uses Pekar K-68 carbs.**
- **Ken (U-2 Cycles) did a nice job with the machining, the surfaces were clean and flat and Ken expanded the mounting holes as needed so that they will fit the American import rigs (John's originally had Mikuni carbs with a slightly larger distance between the threaded mounting holes in the heads).**
- **Ken's kit comes with the two machined adapters/flanges, some quality heater type rubber hose, hose clamps, longer threaded studs, and two gaskets.**
- **John lost one of the gaskets that came with the kit, and wanted to experiment making his own gaskets with some thick fiber exhaust manifold gasket material that Bill Glaser gave him. Maybe I'll post the gasket making part in another thread. So John did not use the gaskets that came with Ken's kit.**
- **John also used different threaded studs than the ones that came in the kit. When he installed his K-68's about a year ago, he used studs that had 8mm coarse threads on both ends. The studs that Ken sent are coarse threads on one side and fine threads on the other end. He could have used some fine thread nuts to solve the problem, but decided to pick up some 8mm x 50mm studs with coarse threads on both ends from the local Ace Hardware. John really liked to torque these threads down to avoid a leak, and just felt better torquing the thicker threads. It probably doesn't matter, it's more of a "piece-of-mind" thing.**
- **Installation was pretty easy, just remove the branch tube (John has CEET tubing), remove the fuel lines, pop off the carbs (No need to disconnect the cables or pull the slides, John just set the carb on the cylinder while working on it), put the longer threaded studs in, slide a gasket on, then the flanged adapter, then another gasket and then the carb. He taped open the throttle wide open to peek down thru the carb and thru the flanged adapter to the head to make sure everything lined up OK. I also test fit everything before installing it. Once everything was in place, just put the lock washers and nuts on the ends on the studs and tighten them down. You will need a "stubby" wrench to tighten down the nuts on the inboard sides of the carbs.**
- **Once both sides are tightened down, fish the hose between the two sides, between the alternator and the airbox, slide the clamps on each end of the hose and pop the hose ends on to the flanged adapters and tighten the clamps. Put the fuel lines back on the carbs and reconnect the air inlet branch tubes and you're done.**
- **John used home-made gaskets out of thicker gasket material, and coated them with some copper high-temperature RTV sealant. Again, it might not be necessary to do this, but it probably wouldn't hurt and more fidgety old me "piece-of-mind", since I've already done the "Holey Piston" thing once before due to a carb flange leak.**
- **Update: John has installed for a few months now and they are great. They make the throttle more responsive and add a little top-end power. It also makes the idle easier to set, with the balancer, you can compensate for one carb being a little off at idle. Only downside is that it idles a bit richer so I had to adjust the air screw settings slightly.**

Hypercharger / Inertial Balancer on 650cc Engine with K-68 Carbs by JohnBG (www.sovietsteeds.com) (cont.)



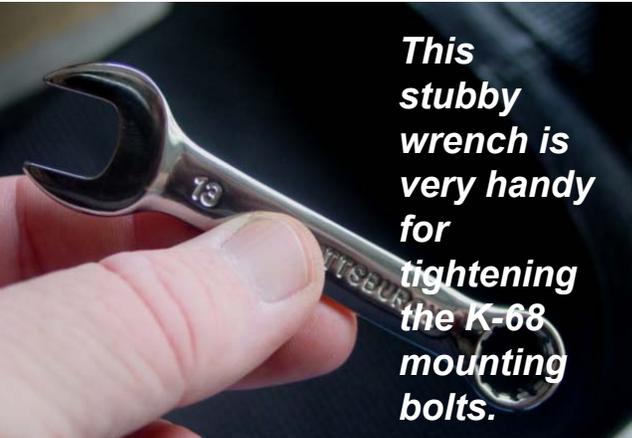
Ken Ulrich's Hypercharger kit



John made his own gaskets.



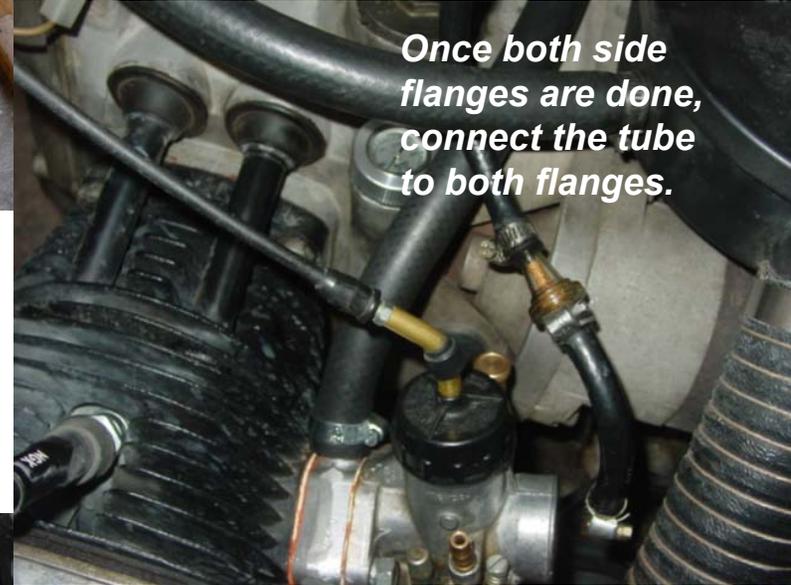
Copper high-temp RTV is your friend.



This stubby wrench is very handy for tightening the K-68 mounting bolts.



John used some better quality studs I picked up at Ace Hardware.



Once both side flanges are done, connect the tube to both flanges.



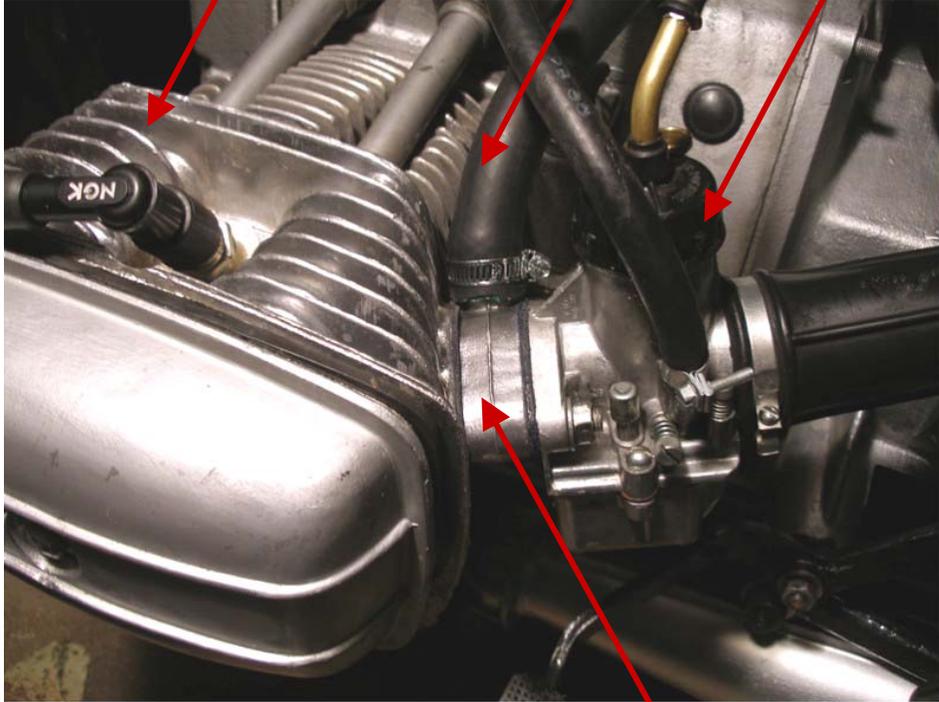
Sandwich the flange with two gaskets between the carb and head.

Example of Inertial Super-Charger Installed on a 1973 Dnepr MT-9 by Christian Schneider (www.russianiron.com)

650cc Engine

Vacuum Cross-Over Hose to Alternate Carb

Pekar K-68 Carb



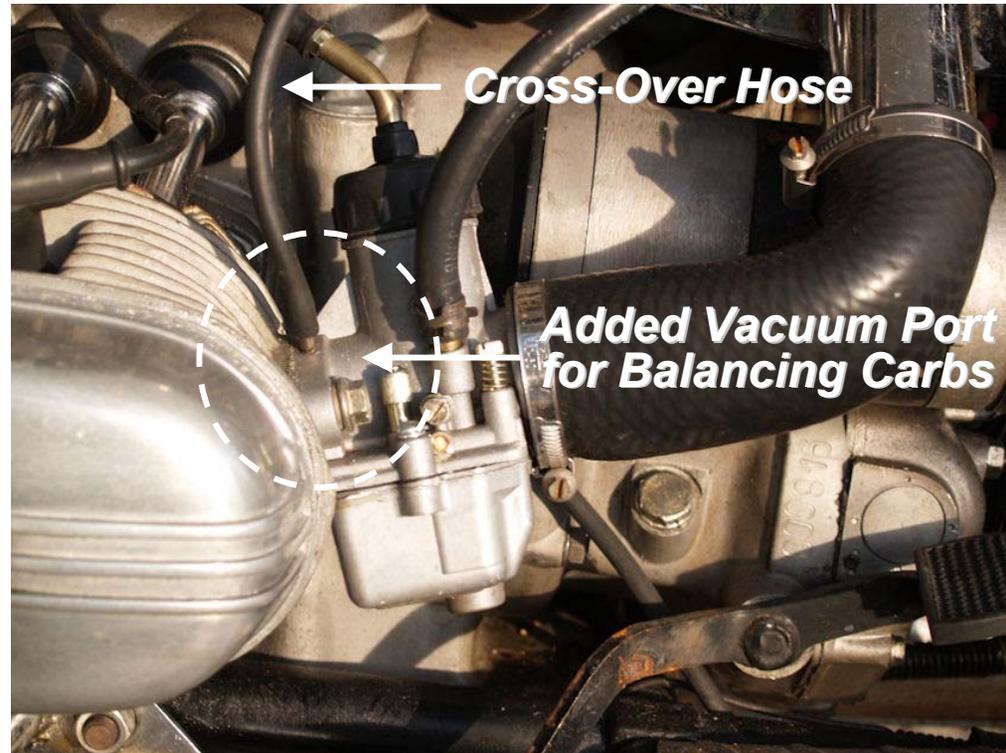
Collector



Carb *Flange Modification* for Inertial Super-Charger

(sovietsteeds.com)

- **2000 Ural Patrol 650cc with Pekar K-68 Carbs**
- **Mod to Carb before Installation on the Bike**
- **Gives a Vacuum Port for a Twinmax Balancing Meter**
- **Hook Both Carbs Together for a Smother Ride**
- **Used Big, Wide Papermate Ink-Pen Filler for the Stem**
- **Preparation of Tubing**
 - **Cut the Ink Pen Filler**
 - **Place It on Drill Press**
 - **Put a Sop Rag Around It**
 - **Turn on Drill to Spin Out All the Ink**
- **Drill Out the Flange and Install Vacuum Port**



Home-Made Super-Charger Collector

(bcozz.multiply.com)

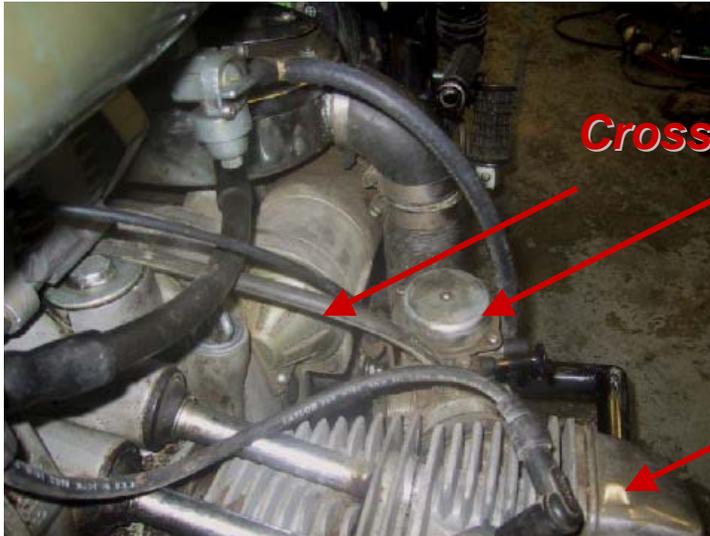
- **From: Seriousbill Dec 1, '09**
- **Used the Rubber Heat-Proof Manifold from MH moto world**
 - http://stores.shop.ebay.co.uk/MH-MOTO-WORLD_W0QQ_armrsZ1
- **Big Fan of Inertial Supercharger with a Large-Bore Rubber Hose**
 - Russian Ones Are Poorly Made and mean that you have to swap the carbs over to stop the float bowls hitting the gearbox. They work well on the sidevalve (SV) bike but mixture adjustment becomes a bit tricky to say the least!
- **Modifications**
 - Bored a Hole in the Side of the Manifold and Finished It to 15mm using a Dremel and Burr
 - Cut a Small Section of Copper Pipe with 16mm O.D.
 - This put it into the bore of the manifold and pushed it into the hole from the inside until there was about 3mm left to go
 - Run some superglue round the bit left and shove it the rest of the way in USING A SCREWDRIVER BLADE, NOT MY FINGERS!
 - Mixed some epoxy and run some around the copper tube on the outside of the manifold - don't want an air leak here.



Faux Super-Charger on a 750cc Engine

(www.russianiron.com) by Dave O, CMSI 2000 Ural Patrol

- **Supercharger Uses Inertia of the Air-Flow to Effect Horsepower (HP) Boost**
 - It does this by the crossover tube allowing fuel mixture to flow to the opposite cylinder
 - When one intake valve is closed, and the other is opening. Imagine you are sitting on your bike, the left cylinder just completed the intake stroke, and the intake valve closes, all that mixture that was rushing in to charge the left cylinder, now must come to a stop. But the right cylinder is now just opening the intake valve, so this inertia of rushing fuel mixture has found a path to the right cylinder thru the cross over tube, and rushes over to pack more mixture into the right cylinder.....if the throttles are opened. This makes for a free HP boost at lower rpms, when you get up about 3500 rpm (estimate) it fades to zero boost increase.
- **Another Benefit; if you break a throttle cable, the cross over tube will feed the failed throttle cable side, allowing you to ride a considerable distance, with adequate power, and not overheat if you are reasonable in your throttle use.**
- **Problem with 750cc Engine and Keihin Carbs**
 - Problem is the 750 carb angles...with the added distance of the installed adapter, the left carb branch intake elbow (that goes up to the air-box) is going to be hard up against the starter and, due to the width of the air-box, it will be a real bitch to get the 90's onto the air-box. I'm using a cut down 650 airbox and barely have enough room to get the 90's on now, can't cut them any shorter....look where the upper 90 meets the airbox, this distance will be even less with the adapter installed. I do use the vacuum ports for a balance tube that does make up for any small discrepancy in carb synch.

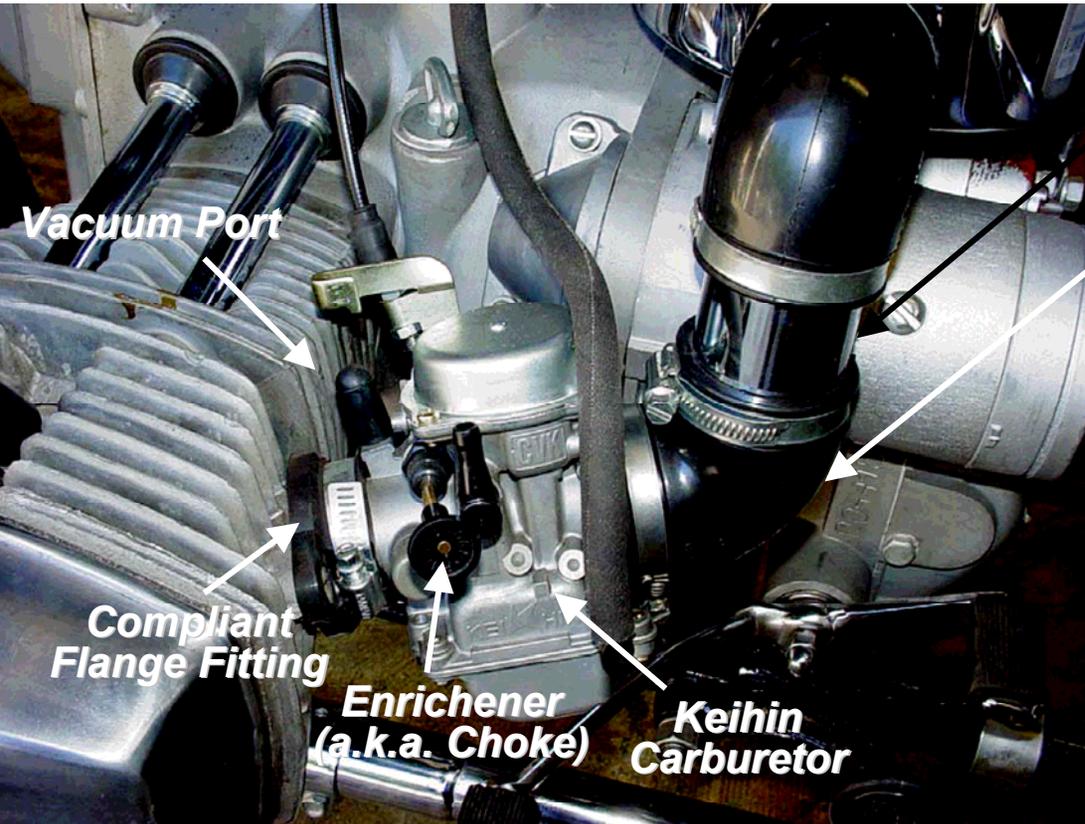


Crossover Hose

Keihin Carb

750cc Engine

32 mm CVK Keihin Carburetor



Vacuum Port

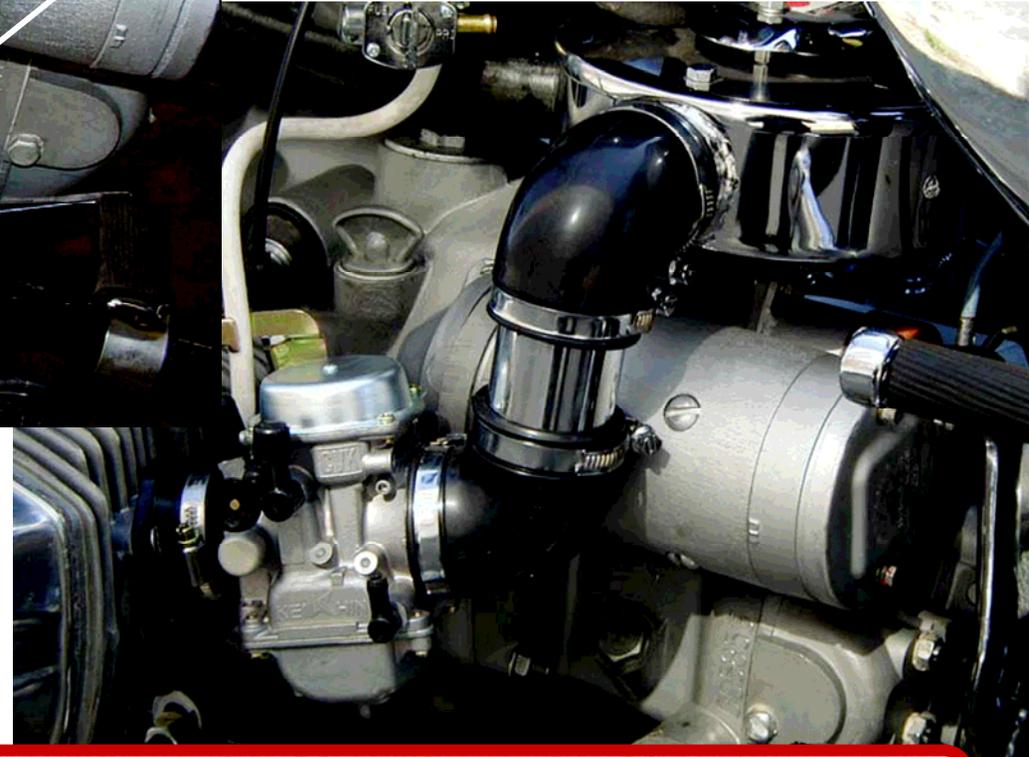
Compliant Flange Fitting

Enrichener (a.k.a. Choke)

Keihin Carburetor

Branch Pipe

The 90° elbow would be up-against the starter and too far aft of the air-cleaner elbow if the Russian Inertial Supercharger is inserted.



Insertion of a Russian Inertial Supercharger would place the 90° air-branch elbow too close to the starter and too far behind the air-cleaner.

Poor Man's Inertial Super-Charger Installation

• Installation Problems

–Interference Fit

- I don't think it will work on the bikes equipped with electric starters as the bottom rubber elbow will hit the side of the starter. This happens because the fitting of the super-charger in-between the intake manifold and the head moves the carb and its rubber elbow to the rear thus hitting the side of the starter.**

• Inexpensive Inertial Super Charger

- If you have a vacuum petcock you can tee off the hose to feed it a double signal which may help at higher speeds too.**

–Use 6 mm (1/4") ID Hose

–Hose Must Be Strong Enough Not to Collapse

–Possibly Put Petcock in "Prime" and Tie Carb Vacuum Ports Together

• Poor Man's "Inertial Super Charger" (2010 Black Patrol, sovietsteeds.com)

–Connect the Two Vacuum Ports on Carbs Together 1/4" Fuel Line and 2 Hose Clamps

–Ran the Hose Up over the Alternator and Down to Each Carb

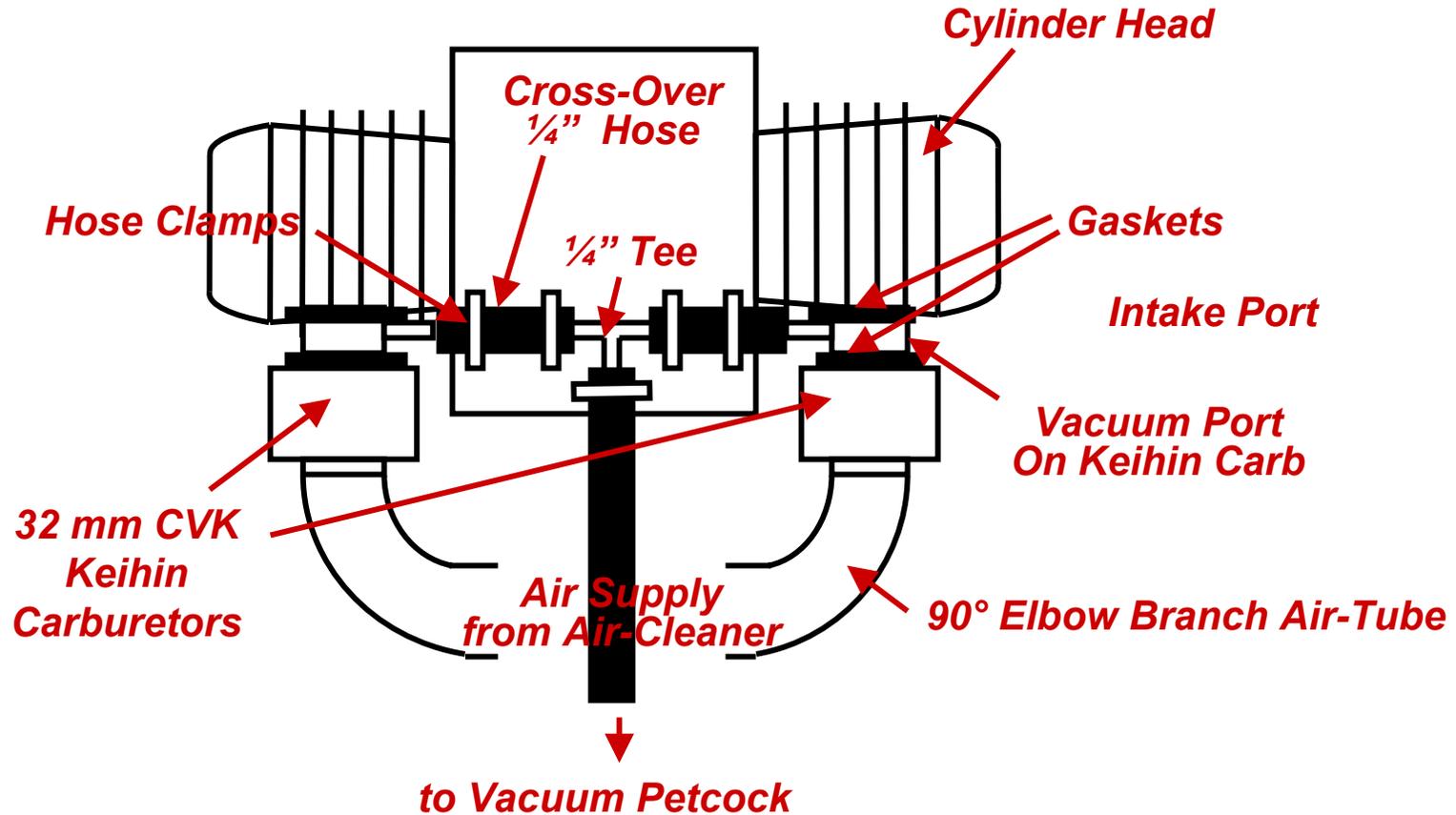
–Used a Manual Petcock so Both Ports Were Free

–Could Easily Install a Plastic "Tee" to Retain the Vacuum Petcock

–Immediate Difference in the Way It Ran

- Backed Off the Idle Screws & Turned Down the Fuel Screws a 1/2 turn, as the Idle was @ 1500rpm Started Up**
- Let It Warm-Up and Got It Settled Down to a Very Steady Idle, Best It Had Been in a Long Time**
- Smoother, Seemed to be More Responsive and Pulled Max Rev's Very Smartly**
- Before It Had a Tendency to Hang a Bit during Gearshifts and Now Completely Gone**
- Really Impressed with the Improvement and It Only Cost a Couple of Bucks**

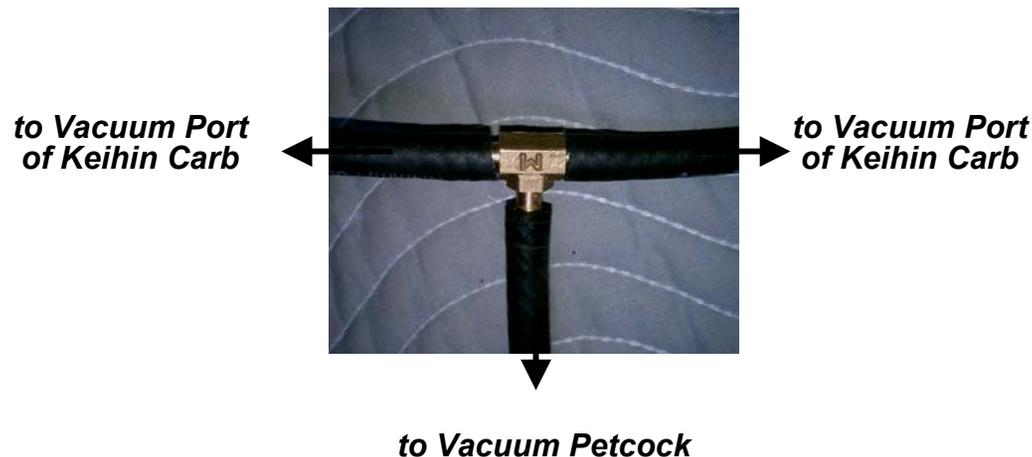
Poor Man's Inertial Super-Charger Installation



The poor man's supercharger is a low-cost method of achieving limited improvement at the low end of the performance curve for a modest investment. It simply connects the unused vacuum ports together using a 1/4" fuel hose. A plastic "T" is inserted in the cross-over hose to retain the vacuum petcock.

Poor-Man's Inertial Super-Charger (sovietsteeds.com)

- **On Top of Keihin Carbs Are Ports with Plugs to Connect the TwinMax (or vacuum petcock if you have one)**
- **Put the Petcock on Prime and Swap the Vacuum Hose for One on the Twinmax**
- **1/4" is Minimum, 1/2" Better; Bigger Diameter Is Better**
- **Use a 1/4" line between the Carb Vacuum Nipples, to Balance and Smooth Out Any Differential in the Synch between the 2 Carbs**
- **Synch the Carbs Individually and Set the Idle as Low as Possible**
- **Vacuum Ports Are identical... but only one is needed to open the petcock**
- **If the Engine Is Allowed to Sneak Air In Past the Vacuum Ports, It Will Run Lean and Risk Burning a Piston or Valve. Plug Them Up Tight If Not Used.**



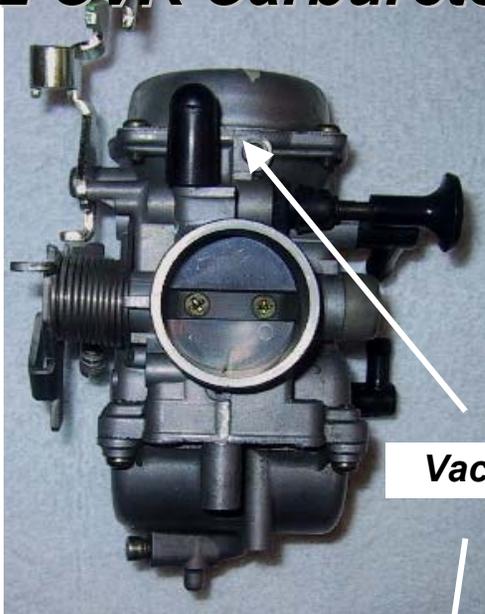
Carb Flanges with Vacuum Ports

(holopawcorvette.webpointusa.com)

- **Gene (Holopaw) Sells Carb Flanges for Mikuni Carbs**
 - **Has Vacuum Ports**
 - **Sold As Set for \$44.95 plus Shipping & Handling**



32 CVK Carburetor ("The Unofficial Ural 750cc Service Manual," www.myural.com/)

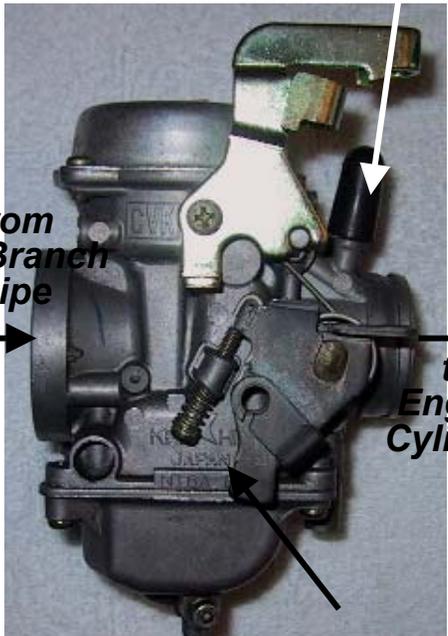


Vacuum Port

Front-View, Compliance Fitting Side



Close-up of manometer's (TwinMax) tubing attaches to the carburetor



from Air-Branch Pipe

to Engine Cylinder

Right-Side, Idle Setting Screw



Top-View (Diaphragm Cap)



Vacuum Nipple

Poor Man's Inertial Super-Charger on Keihin Carbs

